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AD-740 900

HEAVY LIFT HELICOPTERS

A DDC BIBLIOGRAPHY

DDC-TAS-72-16-1

APRIL 1972

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13 ABSTRACT This bibliography contains unclassified references on Heavy Lift Helicopters with a minimum payload of about 9,000 pounds or a minimum gross weight of 17,000 pounds. These references relate to rotor characteristics, rotor systems, rotor loads, lift propulsion, payloads, heavy lift rotors, configurations, design, and performance capabilities of the heavy lift helicopters. Computer-generated indexes of Corporate Author-Monitoring Agency, Subject, Personal Author, and Title are included.		

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HEAVY LIFT HELICOPTERS

A DDC BIBLIOGRAPHY

October 1962 - January 1971

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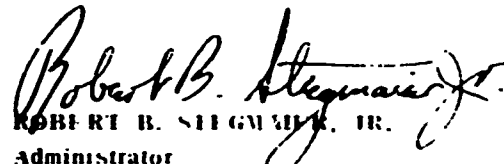
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F O R E W O R D

This bibliography contains 34 unclassified references relating to *Heavy Lift Helicopters* with a minimum payload of about 9,000 pounds or a minimum gross weight of 17,000 pounds. These references were selected from entries processed into the Defense Documentation Center Data Bank during the period of January 1953 through December 1971.

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Administrator
Defense Documentation Center

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TITLE.....	T-1
PERSONAL AUTHOR.....	P-1

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM09

AD-286 576

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

PROBLEMS OF THE AERODYNAMICS OF HELICOPTER LIFTING
ROTORS (U)

OCT 62 IV
REPT. NO. TT 62 815

UNCLASSIFIED REPORT

DESCRIPTORS: •HELICOPTER ROTORS, AERODYNAMIC
CHARACTERISTICS, HOVERING, LANDINGS, LIFT, LOAD
DISTRIBUTION, MATHEMATICAL ANALYSIS, TAKE-OFF, THEORY,
TRANSLATIONS, VELOCITY, VORTICES (U)
IDENTIFIERS: USSR, HEAVY LIFT HELICOPTERS (U)

RESULTS OF EXPERIMENTAL RESEARCH ON HELICOPTER
ROTORS ARE PRESENTED IN THE HOVERING REGIME.
OPTIMUM PARAMETERS ARE DISCUSSED FOR HEAVILY LOADED
ROTORS. A GENERALIZED VORTICITY THEORY OF THE
HELICOPTER LIFTBORONGIZ, MOSKVA, 141P., 1961)

UNCLASSIFIED REPORT DESCRIPTORS: •HELICOPTER
ROTORS, LOAD DISTRIBUTION, LIFT, VORTICES,
VELOCITY, AERODYNAMICS, TAKE-OFF, LANDING,
MATHEMATICAL ANALYSIS, THEORY, USSR,
TRANSLATIONS. IDENTIFIERS: HOVERING. RESULTS
OF EXPERIMENTAL RESEARCH ON HELICOPTER ROTORS ARE
PRESENTED IN THE HOVERING REGIME. OPTIMUM
PARAMETERS ARE DISCUSSED FOR HEAVILY LOADED ROTORS.
A GENERALIZED VORTICITY THEORY OF THE HELICOPTER
LIFTING ROTOR IS SET FORTH; THIS MAKES IT POSSIBLE TO
DETERMINE THE INDUCED VELOCITY AT ANY POINT IN SPACE
FOR THE BASIC FLIGHT MODE. THE RESULTS OF
AERODYNAMIC RESEARCH ON COMPUTATION OF THE FLIGHT
CHARACTERISTICS OF THE HELICOPTER ROTOR IN THE
VERTICAL-DESCENT MODE ARE SET FORTH. METHODS ARE
GIVEN FOR DETERMINING THE CHARACTERISTICS OF THE
ROTOR. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM09

AD-408 650

HUGHES TOOL CO CULVER CITY CALIF

PRELIMINARY DESIGN STUDY HOT CYCLE RESEARCH
AIRCRAFT.

(U)

DESCRIPTIVE NOTE: SUMMARY REPT.

MAR 63 174P

CONTRACT: DA-44-177-TC-832

PROJ: DA-1-D-121401-D-144

TASK: 1-D-121401-D-14403

MONITOR: TRECOM TR-62-102

UNCLASSIFIED REPORT

DESCRIPTORS: (•HELICOPTERS, DESIGN), (•HELI
COPTER ENGINES, GAS TURBINES), JET HELICOPTER
ROTORS, AERODYNAMIC CONFIGURATION, WEIGHT,
AUTOGYROS, STABILITY, CONTROL, AIRFRAMES,
CARGO, PAYLOAD, DUCTS, FEASIBILITY STUDIES.

(U)

IDENTIFIERS: T-64 ENGINES, S-60 AIRCRAFT, S-
64 AIRCRAFT, J-85 ENGINES, 1963, HEAVY LIFT
HELICOPTERS

(U)

A PRELIMINARY DESIGN STUDY HAS BEEN COMPLETED OF A
TWIN-ENGINE HOT CYCLE RESEARCH HELICOPTER UTILIZING
THE EXISTING ROTOR WITH THE FOLLOWING DESIGN
OBJECTIVES: (1) 15,300 LB DESIGN GROSS WEIGHT;
(2) 25,500 LB ALTERNATE HEAVY-LIFT HOVERING
GROSS WEIGHT; (3) 145 KT AT A GROSS WEIGHT OF
15,300 LB, HELICOPTER MODE; AND (4) 197 KNOTS AT
A GROSS WEIGHT OF 10,000 LB AUTO GYRO MODE. MAJOR
DESIGN AREAS COVERED IN THE STUDY INCLUDE THE ROTOR
MODIFICATIONS, AIRFRAME, ENGINE INSTALLATION, ENGINE
CONTROLS, FLIGHT CONTROLS, DIVERTER VALVES, BLADE
DUCT VALVES, FLIGHT INSTRUMENTATION, ELECTRICAL
SYSTEM, HYDRAULIC SYSTEM, AND FUEL SYSTEM.
(AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM09

AD-822 586

BOEING CO MORTON PA VERTOL DIV

TRANSMISSION STUDY FOR TANDEM-ROTOR SHAFT-DRIVEN
HEAVY-LIFT HELICOPTERS.

(U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 27 JUN-27 DEC 64.

SEP 65 148P

MACK, JOHN ;

REPT. NO. R-379

CONTRACT: DA44 177AMC241T

PROJ: DA-1M121401D144

TASK: 1M121401D14414

MONITOR: USAAVLABS ,

TR-65-36

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SUPPLEMENTARY NOTE: AVAILABLE COPY WILL NOT PERMIT FULLY
LEGIBLE REPRODUCTION. REPRODUCTION WILL BE MADE IF
REQUESTED BY USERS OF DDC. COPY IS AVAILABLE FOR PUBLIC
SALE.

DESCRIPTORS: (*HELICOPTER ROTORS, TRANSMISSIONS),
(*TRANSMISSIONS, HELICOPTERS), SHAFTS, HELICOPTER
ENGINES, DRIVES, BEARINGS, TITANIUM, TENSILE
PROPERTIES, FATIGUE(MECHANICS), REDUCTION GEARS,
CONTROL SYSTEMS

(U)

MECHANICAL DRIVE SYSTEMS FOR HEAVY-LIFT TANDEM-
ROTOR HELICOPTERS WERE STUDIED. THREE- AND FOUR-
ENGINE CONFIGURATIONS WERE ANALYZED.
CONFIGURATIONS INCLUDED AFT-MOUNTED AND FORE- AND
AFT-MOUNTED ENGINES, SINGLE AND DUAL DRIVE SYSTEMS,
AND HIGH-MOUNTED AND LOW-MOUNTED AFT PLANETARIES.
WEIGHTS WERE ESTIMATED. PROBLEMS OF GEAR SURFACE
DURABILITY, MULTIENGINE CONTROL, AND OVER-RUNNING
CLUTCHES WERE DEFINED. THE EFFECTS OF INCREASED
GEAR TOOTH BENDING FATIGUE STRENGTH, HIGHER BEARING
CAPACITY, SUPERCRITICALSPEED SHAFTING, AND THE USE OF
TITANIUM AND IMPROVED FERROUS METALS WERE EVALUATED.
IN THE MORE SIGNIFICANT FACTORS, THE SATISFACTORY
SOLUTION OF THE HEAVY-LIFT HELICOPTER DRIVE SYSTEM
LIES WITHIN THE CURRENT STATE-OF-THE-ART. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM09

AD-624 145 1/3 21/5
KAMAN AIRCRAFT CORP BLOOMFIELD CONN

A MAIN POWER SYSTEM FOR SHAFT-DRIVEN HEAVY LIFT
HELICOPTERS.

(U)

DESCRIPTIVE NOTE: FINAL REPT.,
OCT. 65 119P BOSSLER, ROBERT B. , JR.;
REPT. NO. KAMAN-R-555
CONTRACT: DA-44-177-AMC-212(T)
PROJ: DA-1M121401D144
TASK: 1M121401D14414
MONITOR: USAAVLABS , TR-65-52

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*HELICOPTER ENGINES, DESIGN),
(*HELICOPTERS, POWER), (*TURBINES, HELICOPTERS),
HELICOPTER ROTORS, TRANSMISSIONS, SHAFTS
IDENTIFIERS: TIGR (TURBINE INTEGRATED GEARED
ROTOR)

(U)

(U)

MULTIPLE GAS GENERATORS, INSTALLED IN A
CONVENTIONAL HORIZONTAL POSITION, ARE ALL GAS-COUPLED
TO THE SAME PERIPHERALLY-DRIVEN REMOTE TURBINE OF THE
LIFT AND CRUISE FAN TYPE. THE REMOTE TURBINE IS
MOUNTED CO-AXIALLY TO A SPEED-REDUCING GEARBOX WHICH
IS ALSO COAXIAL WITH THE ROTOR. THE CONCEPT IS
KNOWN AS THE TURBINE INTEGRATED GEARED ROTOR
'TIGR'. THE TIGR ARRANGEMENT ELIMINATES FROM
TRANSMISSION DESIGN THE FUNCTIONS OF ENGINE
COMBINING, CHANGE OF DIRECTION, PART OF THE REQUIRED
SPEED REDUCTION FROM CONVENTIONAL ENGINE SPEED TO
ROTOR SPEED, MISALIGNMENT COUPLINGS AND ALL OF THE
MULTIPLE INDIVIDUAL ENGINE OVERRUNNING-CLUTCH
PROVISIONS REQUIRED FOR ENGINE OUT OPERATION AND FOR
AUTOROTATION. A THREE-PHASE PROGRAM OF DESIGN,
ANALYSIS, AND COMPARATIVE EVALUATION OF TIGR,
INCLUDING THE EFFECT ON ADJACENT SYSTEMS AND THE
RESULTING HEAVY LIFT HELICOPTER (HLH)
AIRCRAFT, IS PRESENTED. THE RESULTS SHOW TIGR
HAS A 280 PERCENT IMPROVEMENT IN MEAN TIME BETWEEN
MISSION-ABORT FAILURE OVER CONVENTIONAL MULTIPLE
ENGINE/TRANSMISSION PRACTICE FOR THE ENTIRE HLH
POWER TRAIN FROM THE ENGINE INLETS TO THE ROTOR HUB.
COST PER HLH FLIGHT HOUR IS REDUCED, AND THE HIGH
FUEL EFFICIENCY OF MECHANICALLY-DRIVEN ROTORS IS
RETAINED. TIGR IS BELIEVED TO BE EMINENTLY
PRACTICAL AND IS READY FOR DYNAMIC TESTING.
(AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM09

AD-624 716 1/3 21/5
HILLER AIRCRAFT DIV FAIRCHILD HILLER CORP PALO ALTO
CALIF

HEAVY-LIFT TIP TURBOJET ROTOR SYSTEM. VOLUME XI.
ENGINE DESIGN.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.

OCT 65 111P
CONTRACT: DA-44-177-AMC-25(T)
PROJ: DA-1M121401D144
TASK: 1M121401D11412
MONITOR: USAAVLABS, TR-64-68K

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH
CONTINENTAL AVIATION AND ENGINEERING CORP.,
DETROIT, MICH., REPT. NO. CAE-942. SEE ALSO AD-
624 814.

DESCRIPTORS: (•HELICOPTER ENGINES, DESIGN),
(•TURBOJET ENGINES, DESIGN), (•HELICOPTER ROTORS,
DESIGN), ROTOR BLADES (ROTARY WINGS), HOVERING,
FUEL PUMPS, JET ENGINE INLETS, LIFT
IDENTIFIERS: HEAVY LIFT HELICOPTERS

(U)

(M)

THE REPORT DISCUSSES THE DESIGN OF THE MODEL 357-
1 ENGINE FOR ROTOR TIP OPERATIONAL ENVIRONMENT.
THE DETAIL DESIGN MEETS REQUIREMENTS OF MIL-E-
5007B EXCEPT FOR ITEMS PECULIAR TO ROTOR TIP
OPERATION. THESE ITEMS INCLUDE OPERATIONAL
ATTITUDES, EFFECT OF CONTINUOUS GYROSCOPIC COUPLES
AND HIGH G FIELD ENVIRONMENT. THE REPORT INCLUDES
AN ANALYTICAL DESIGN ANALYSIS OF THE STATIC
STRUCTURE, ROTATING ELEMENTS, BEARINGS, ACCESSORY
DRIVES, LUBRICATION SYSTEM, AND MISCELLANEOUS ENGINE
PARTS. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM09

AD-624 762 1/3
HILLER AIRCRAFT DIV FAIRCHILD HILLER CORP PALO ALTO
CALIF

HEAVY-LIFT TURBOJET ROTOR SYSTEM. VOLUME III. DESIGN
LAYOUT STUDIES. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.

OCT 65 113P

REPT. NO. ENGINEERING-64-43

CONTRACT: DA-44-177-AMC-25(T)

PROJ: DA-1M121401D144

TASK: 1M121401D1412

MONITOR: USAAVLABS ; TR-64-68C

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•ROTOR BLADES(ROTARY WINGS),
DESIGN); (•HELICOPTER ROTORS, DESIGN), TURBOJET
ENGINES, HELICOPTER ENGINES, HELICOPTERS,
LIFT (U)

IDENTIFIERS: HEAVY LIFT HELICOPTERS (M)

THE REPORT DESCRIBES THE DESIGN LAYOUT STUDIES
PERFORMED DURING THE PRELIMINARY DESIGN OF A TIP
TURBOJET ROTOR SYSTEM APPLICABLE TO A HELICOPTER OF
60,000 POUNDS TO 80,000 POUNDS GROSS WEIGHT. THE
BASIC ROTOR SYSTEM GEOMETRY FOR WHICH THESE STUDIES
WERE PERFORMED WAS ESTABLISHED BY MEANS OF A
PARAMETRIC DESIGN STUDY. DESIGN INVESTIGATIONS WERE
DIRECTED PRIMARILY TOWARDS THE COMPONENTS ABOVE THE
ATTACHMENT OF THE ROTOR SYSTEM TO THE AIRFRAME.
THESE INCLUDED ROTOR HUB AND BLADE RETENTION
CONFIGURATION, ROTOR BLADE STRUCTURAL ARRANGEMENT,
POWER PLANT INSTALLATION, FLIGHT CONTROLS, AND
AIRFRAME/ROTOR MOUNTED FUEL, LUBRICATION, ELECTRICAL,
ENGINE STARTING, AND POWER MANAGEMENT SYSTEMS.
CONSIDERATION WAS ALSO GIVEN TO TAIL ROTOR AND
ACCESSORIES DRIVE SYSTEMS. THESE DESIGN STUDIES
AND ASSOCIATED STRESS AND WEIGHT ANALYSES HAVE
ESTABLISHED THE PRACTICABILITY OF THE DESIGN AND
FABRICATION OF THE TIP TURBOJET ROTOR SYSTEM, AS WELL
AS PROVIDING VERIFICATION FOR THE SYSTEMS' WEIGHTS
ESTABLISHED BY THE PARAMETRIC DESIGN STUDY WEIGHT
EQUATIONS. DEVELOPMENT OF A TIP TURBOJET
HELICOPTER OF 60,000 POUNDS TO 80,000 POUNDS GROSS
WEIGHT HAS BEEN FOUND TO BE WELL WITHIN THE STATE OF
THE ART OF ALL TECHNOLOGIES ASSOCIATED WITH THE
DESIGN AND FABRICATION OF AN AIRCRAFT OF THIS TYPE.
(AUTHOR: (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM09

AD-624 763 1/3
HILLER AIRCRAFT DIV FAIRCHILD HILLER CORP PALO ALTO
CALIF

HEAVY-LIFT TURBOJET ROTOR SYSTEM. VOLUME IV. STATIC
AND DYNAMIC LOADS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.

OCT 65 117P
REPT. NO. ENGINEERING-64-44
CONTRACT: DA-44-177-AMC-25(T)
PROJ: DA-M121401D144
TASK: 1M121401D14412
MONITOR: USAAVLABS , TR-64-68D

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-624 762.

DESCRIPTORS: (•HELICOPTER ROTORS, DESIGN),
LOADING(MECHANICS), STRUCTURAL PARTS, TURBOJET
ENGINES, ROTOR BLADES(ROTARY WINGS), HELICOPTERS,
LIFT (U)
IDENTIFIERS: HEAVY LIFT HELICOPTERS (M)

THE REPORT PRESENTS THE STRUCTURAL DESIGN CRITERIA,
STATIC DESIGN LOADS, AND DYNAMIC DESIGN LOADS FOR THE
MODEL 1108 HELICOPTER. THE VOLUME IS THE BASIS
FOR THE STRUCTURAL DESIGN AND ANALYSIS OF THE TIP
TURBOJET MAIN ROTOR SYSTEM. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM09

AD-624 764 1/3

HILLER AIRCRAFT DIV FAIRCHILD HILLER CORP PALO ALTO
CALIF

HEAVY-LIFT TIP TURBOJET ROTOR SYSTEM. VOLUME VI.
DYNAMIC AND AEROELASTIC STUDIES.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.

OCT 65 55P

REPT. NO. HILLER-ER-64-46

CONTRACT: DA-44-177-AMC-25(T)

TASK: IM121401D-14412

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-624 763.

DESCRIPTORS: (•HELICOPTER ROTORS, DESIGN); (•ROTOR
BLADES(ROTARY WINGS), AERODYNAMIC CHARACTERISTICS),
HELICOPTER ENGINES, TURBOJET ENGINES, LIFT,
AEROELASTICITY, FREQUENCY, FLUTTER, SIMULATION,
ANALOG COMPUTERS, HELICOPTERS
IDENTIFIERS: HEAVY LIFT HELICOPTERS

(U)

(M)

THE STUDIES PERTAIN TO DYNAMIC AND AEROELASTIC
PHENOMENA OF THE ROTOR SYSTEM FOR A HEAVY-LIFT
HELICOPTER EMPLOYING TURBOJET ENGINES MOUNTED AT THE
TIPS OF THE ROTOR BLADES. A MAJORITY OF THE ROTOR
BLADE FREQUENCY AND BLADE FLUTTER BOUNDARY WORK WAS
ACCOMPLISHED USING A LUMPED MASS ROTOR BLADE
SIMULATION ON A DIRECT ANALOG COMPUTER. THE
IMPORTANT RESULTS OF THESE STUDIES AS WELL AS OTHER
DYNAMIC INVESTIGATIONS WHICH ARE NECESSARY TO INSURE
ADEQUATE HELICOPTER PERFORMANCE ARE INCLUDED.
(AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM09

AD-624 813 1/3
HILLER AIRCRAFT DIV FAIRCHILD HILLER CORP PALO ALTO
CALIF

HEAVY-LIFT TIP TURBOJET ROTOR SYSTEM. VOLUME VII.
WEIGHT AND BALANCE STUDIES. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.

OCT. 65 30P
REPT. NO: HILLER-ER-64-47
CONTRACT: DA-44-177-AMC-25(T)
PROJ: DA-1M1214010144
TASK: 1M121401014412
MONITOR: USAAVLABS . TR-64-686

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-624 764.

DESCRIPTORS: (*HELICOPTER ROTORS, DESIGN),
(*HELICOPTERS, WEIGHT), STATISTICAL ANALYSIS,
ROTOR BLADES(ROTARY WINGS), DRAG, LIFT,
HELICOPTER ENGINES, TURBOJET ENGINES, CENTER OF
GRAVITY (U)

IDENTIFIERS: HEAVY LIFT HELICOPTERS (H)

THE REPORT DISCUSSES STATISTICAL, ANALYTICAL, AND
EMPIRICAL WEIGHT ANALYSIS METHODS USED TO EVALUATE
THE EMPTY WEIGHT OF THE HELICOPTER. BLADE LAG
CHARACTERISTICS ARE ALSO DISCUSSED, INCLUDING AN
ANALYSIS SHOWING BLADE LAG ANGLES WITH ONE AND TWO
ENGINES INOPERATIVE. INCLUDED ARE AIRCRAFT BALANCE
PREDICTIONS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM09

AD-624 814 1/3

HILLER AIRCRAFT DIV FAIRCHILD HILLER CORP PALO ALTO
CALIF

HEAVY-LIFT TIP TURBOJET ROTOR SYSTEM. VOLUME VIII.
WIND-TUNNEL STUDIES.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.

OCT. 65 540P

REPT. NO. ENGINEERING-64-48

CONTRACT: DA-44-177-AMC-25(T)

PROJ: DA-1M121401D144

TASK: 1M121401D14412

MONITOR: USAAVLABS ,

TR-64-68H

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-624 813.

DESCRIPTORS: (•HELICOPTER ROTORS, DESIGN), (•ROTOR
BLADES(ROTARY WINGS), MODEL TESTS), (•NACELLES,
MODEL TESTS), AERODYNAMIC CONFIGURATIONS, WIND
TUNNEL MODELS, LIFT, TURBOJET ENGINES,

HELICOPTERS, HYPERSONIC FLOW

(U)

IDENTIFIERS: HEAVY LIFT HELICOPTERS

(M)

WIND-TUNNEL TESTS WERE CONDUCTED TO PROVIDE NACELLE
DESIGN INFORMATION WHICH WOULD ASSIST IN THE DESIGN
OF THE TIP TURBOJET INSTALLATION. THE MODEL WAS
CONSTRUCTED TO PROVIDE FOR SINGLE, OVER-UNDER, AND
SIDE-BY-SIDE ENGINE ARRANGEMENTS. THE NACELLE
LOADS WERE MEASURED WITH A SIX-COMPONENT STRAIN-GAGE
BALANCE. TESTS WERE CONDUCTED AT NACELLE
REYNOLDS NUMBERS FROM 450,000 TO 1,830,000 WITH
MOST OF THE DATA TAKEN AT THE HIGHER VALUE. THE
MODEL PITCH ANGLE WAS VARIED FROM -3 DEGREES TO +12
DEGREES AND THE YAW ANGLE WAS VARIED FROM -20 DEGREES
TO +20 DEGREES. NACELLE INLET TO FREESTREAM
VELOCITY RATIOS WERE VARIED FROM 0 TO .7625. THE
MAXIMUM OBTAINABLE WITH FREESTREAM TOTAL PRESSURE
SUPPLYING THE ENERGY NECESSARY TO OVERCOME INTERNAL
LOSSES. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM09

AD-624 822 1/2 21/5
HILLER AIRCRAFT DIV FAIRCHILD HILLER CORP PALO ALTO
CALIF

HEAVY-LIFT TURBOJET ROTOR SYSTEM. VOLUME XII. FUEL
PUMP AND CONTROL SYSTEM DESIGN. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.
OCT 65 192P
CONTRACT: DA-44-177-AMC-25(T)
PROJ: DA-1M121401D144
TASK: 1M121401D14412
MONITOR: USAAVLABS , TR-64-68L

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH
CONTINENTAL AVIATION AND ENGINEERING CORP.,
DETROIT, MICH., REPT. NO. CAE-942. SEE ALSO AD-
624 716.

DESCRIPTORS: (•HELICOPTER ROTORS, DESIGN), (•FUEL
PUMPS, DESIGN), (•HELICOPTER ENGINES, FUEL
PUMPS), CONTROL SYSTEMS, TURBOJET ENGINES,
HOVERING, FEASIBILITY STUDIES, LIFT (U)
IDENTIFIERS: HEAVY LIFT HELICOPTERS (M)

THE REPORT DISCUSSES THE PROPOSAL OF A COMBINATION
HYDROMECHANICAL-ELECTRONIC FUEL CONTROL AND FUEL PUMP
FOR CONTROL OF A HELICOPTER ROTOR TIP MOUNTED ENGINE
(CAE MODEL 357-1) WHICH DURING NORMAL OPERATION
IS SUBJECTED TO 235G OF CENTRIFUGAL FORCE. THE
PROPOSED PRELIMINARY DESIGN IS SUBMITTED TO MEET THE
SPECIFICATION REQUIREMENT OF THE ENGINE IN THE TIP
TURBOJET HOVER MODE OF OPERATION. ANALYTICAL
DESIGN STUDIES AND PRELIMINARY TEST RESULTS SHOW
FEASIBILITY OF THIS DESIGN FOR OPERATION IN A 235G
FIELD. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM09

AD-625 818 1/3
HILLER AIRCRAFT CORP PALO ALTO CALIF

HEAVY-LIFT TIP TURBOJET ROTOR SYSTEM. VOLUME I. (U)

DESCRIPTIVE NOTE: SUMMARY REPT.

65 113P
REPT. NO. ER-64-41
CONTRACT: DA-44-177-AMC-25(T)
TASK: IM121401D14412
MONITOR: USAAVLABS, TR-64-68A

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•HELICOPTER ROTORS, DESIGN),
HELICOPTERS, TURBOJET ENGINES, LIFT,
PERFORMANCE(ENGINEERING), WEIGHT, STABILITY (U)
IDENTIFIERS: HEAVY LIFT HELICOPTERS (M)

THE STUDY OF A TIP-TURBOJET-POWERED ROTOR SYSTEM
FOR A HEAVY-LIFT HELICOPTER, WHICH IS PRESENTED IN
THIRTEEN VOLUMES, IS SUMMARIZED. INCLUDED UNDER
THIS GENERAL SUBJECT ARE STUDIES ON PARAMETRIC
DESIGN, PERFORMANCE, STRUCTURES AND DYNAMICS, WIND
TUNNEL, PRELIMINARY DESIGN, WEIGHT AND BALANCE,
STABILITY, AND POWER PLANT. (AUTHOR) (U)

UNCLASSIFIED

/ZOM09

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM09

AD-625 819 1/3 21/5
HILLER AIRCRAFT CORP PALO ALTO CALIF

HEAVY-LIFT TIP TURBOJET ROTOR SYSTEM, VOLUME II.
PARAMETRIC DESIGN STUDY.

(U)

DESCRIPTIVE NOTE: ENGINEERING REPT.

OCT 65 104P

REPT. NO. ER-64-42

CONTRACT: DA-44-177-AMC-25(T)

TASK: 1M121401D14412

MONITOR: USAAVLABS , TR-64-68B

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-625 818.

DESCRIPTORS: (•HELICOPTER ROTORS, DESIGN),
HELICOPTERS, LIFT, TURBOJET ENGINES, ROTOR
BLADES(ROTARY WINGS), OPTIMIZATION, WEIGHT,
AERODYNAMIC CHARACTERISTICS, CONFIGURATION
IDENTIFIERS: HEAVY LIFT HELICOPTERS

(U)

(M)

THE PARAMETRIC ANALYSIS DETERMINES THE OPTIMUM
DESIGN PARAMETERS OF A 24,000-LB.-PAYLOAD HELICOPTER
POWERED BY TURBOJET ENGINES INSTALLED AT THE ROTOR
BLADE TIPS. THE METHOD USED DETERMINED A GROSS
WEIGHT WHICH WOULD SATISFY STATISTICAL COMPONENT
WEIGHT EQUATIONS AND AERODYNAMIC EQUATIONS
SIMULTANEOUSLY. THE OPTIMIZING CRITERION WAS THE
MINIMUM GROSS WEIGHT REQUIRED TO PERFORM A SPECIFIC
MISSION. THE RESULTS OF THE ANALYSIS INDICATE THAT
THE OPTIMUM CONFIGURATION USING THE CONTINENTAL
MODEL 357-1 ENGINE IS A HELICOPTER WITH (A)
FOUR BLADES, (B) TWO ENGINES PER BLADE, AND
(C) A CRANETYPE FUSELAGE. THE OPTIMUM
CONFIGURATION WITH A GENERALIZED OR 'RUBBER' ENGINE
IS A HELICOPTER WITH (A) THREE BLADES, (B)
ONE ENGINE PER BLADE, AND (C) A CRANETYPE
FUSELAGE. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM09

AD-625 820 1/3
HILLER AIRCRAFT CORP PALO ALTO CALIF

HEAVY-LIFT TIP TURBOJET ROTOR SYSTEM. VOLUME V.
STRUCTURAL ANALYSIS.

(U)

DESCRIPTIVE NOTE: ENGINEERING REPT.

OCT 65 127P
REPT. NO. ER-64-45
CONTRACT: DA-44-177-AMC-25(T)
TASK: 1M121401D1 412
MONITOR: USAAVLABS , TR-64-68E

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-624 814.

DESCRIPTORS: (•HELICOPTER ROTORS, DESIGN), (•ROTOR
BLADES(ROTARY WINGS), DESIGN), HELICOPTERS,
TURBOJET ENGINES, LIFT, STRESSES
IDENTIFIERS: HEAVY LIFT HELICOPTERS

(U)

(M)

THE REPORT DISCUSSES STRESS CALCULATIONS FOR MAJOR
STRUCTURAL COMPONENTS OF THIS SYSTEM. TIP ENGINE
ATTACHMENT HARDWARE IS ALSO ANALYZED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM09

AD-625 821 1/3 21/5
HILLER AIRCRAFT CORP PALO ALTO CALIF

HEAVY-LIFT TIP TURBOJET ROTOR SYSTEM. VOLUME IX.
PERFORMANCE ANALYSIS.

(U)

DESCRIPTIVE NOTE: ENGINEERING REPT.

OCT 65 73P
REPT. NO. ER-64-49
CONTRACT: DA-44-177-AMC-25(T)
PROJ: DA-1M121401D144
TASK: 1M121401D14412
MONITOR: USAAVLABS , TR-64-681

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-624 813.

DESCRIPTORS: (•HELICOPTER ROTORS, DESIGN),
(•HELICOPTERS, PERFORMANCE(ENGINEERING)),
ANALYSIS, LIFT, TURBOJET ENGINES,
CONFIGURATION, ROTOR BLADES(ROTARY WINGS)
IDENTIFIERS: HEAVY LIFT HELICOPTERS

(U)

(M)

THE REPORT PRESENTS A PERFORMANCE AND
CHARACTERISTICS SUMMARY OF THE MODEL 1108 TIP
TURBOJET-POWERED HEAVYLIFT HELICOPTER. THE
CONFIGURATION WAS SELECTED FROM A PARAMETRIC ANALYSIS
(USAAYLABS TECHNICAL REPORT 64-688). STANDARD
PERFORMANCE METHODS ARE USED, MODIFIED WHERE
NECESSARY BY FACTORS PECULIAR TO TIP TURBOJET
PROPULSION. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM09

AD-625 822 1/3
HILLER AIRCRAFT CORP PALO ALTO CALIF

HEAVY-LIFT TIP TURBOJET ROTOR SYSTEM, VOLUME X.
STABILITY AND CONTROL.

(U)

DESCRIPTIVE NOTE: ENGINEERING REPT.

OCT. 65 89P
REPT. NO. ER-64-50
CONTRACT: DA-44-177-AMC-25(T)
PROJ: DA-1M121401D144
TASK: 1M121401D14412
MONITOR: USAAVLABS, TR-64-68J

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-625 821.

DESCRIPTORS: (•HELICOPTER ROTORS, DESIGN),
(•HELICOPTERS, PERFORMANCE(ENGINEERING)),
STABILITY, CONTROL, TURBOJET ENGINES, LIFT,
SPECIFICATIONS, HANDLING
IDENTIFIERS: HEAVY LIFT HELICOPTERS

(U)

(M)

THE REPORT DISCUSSES THE RESULTS OF A STABILITY AND
CONTROL ANALYSIS OF A LARGE CRANE-TYPE HELICOPTER
POWERED BY A TIP-MOUNTED TURBOJET SYSTEM.
SPECIFICATION MIL-H-8501A WAS USED AS A GUIDE
FOR CRITERIA. SPECIFICATION CRITERIA WERE MET;
HOWEVER, FOR IMPROVEMENTS IN HANDLING QUALITIES, A
STABILITY AUGMENTATION SYSTEM IS RECOMMENDED.
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM09

AD-625 823 1/3 21/5
HILLER AIRCRAFT CORP PALO ALTO CALIF

HEAVY-LIFT TIP TURBOJET ROTOR SYSTEM. VOLUME XIII.
PRELIMINARY MODEL SPECIFICATION FOR CONTINENTAL MODEL
357-1 ENGINE. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.

OCT 65 53P

CONTRACT: DA-44-177-AMC-25(T)

TASK: 1H121401D14412

MONITOR: USAAVLABS ; TR-64-68M

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH
CONTINENTAL AVIATION AND ENGINEERING CORP.,
DETROIT, MICH. SEE ALSO AD-624 822.

DESCRIPTORS: (•HELICOPTER ROTORS, DESIGN),
(•TURBOJET ENGINES, SPECIFICATIONS), ROTOR
BLADES(ROTARY WINGS), HELICOPTERS, LIFT,
MODELS(SIMULATIONS), PERFORMANCE(ENGINEERING) (U)
IDENTIFIERS: HEAVY LIFT HELICOPTERS (M)

THE REPORT CONTAINS CONTINENTAL PRELIMINARY
MODEL SPECIFICATION NO. 2253-A, WHICH
CONTAINS REQUIREMENT, CAPABILITY, AND ENGINE
PERFORMANCE DATA ON THE CONTINENTAL MODEL 357-1
(1700-POUND THRUST) TURBOJET ENGINE FOR
HELICOPTER ROTOR-TIP MOUNTING. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM09

AD-634 503 1/3 21/5
ARMY AVIATION MATERIEL LABS FORT EUSTIS VA

CH-54A SKYCRANE ENGINE LOAD SHARING. (U)

DESCRIPTIVE NOTE: ENGINEERING LAB, REPT.,
MAY 66 54P CHESTNUTT, DAVID ;BARTEK, L. R.

REPT. NO. USAAVLABS-TR-66-47,
PROJ: DA-1M121401D144
TASK: 1M121401D14415

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•HELICOPTERS,
PERFORMANCE(ENGINEERING)), (•HELICOPTER ENGINES,
LOADING(MECHANICS)), FLIGHT, OPERATION, DATA,
ANALYSIS, TORQUE, TABLES, GRAPHICS (U)
IDENTIFIERS: CH-54A AIRCRAFT (U)

THE ENGINE LOAD-SHARING CHARACTERISTICS OF THE CH-54A SKYCRANE HELICOPTER WERE INVESTIGATED TO DETERMINE IF UNEQUAL LOAD SHARING WOULD BE A SIGNIFICANT PROBLEM. TORQUE-SPLIT SAMPLES WERE SELECTED FROM 67 HOURS OF FLIGHT-LOAD DATA. THE PARAMETERS MEASURED AND RECORDED ON OSCILLOGRAPH RECORDS WERE AIRSPEED, ALTITUDE, ENGINE GAS PRODUCER RPM, ENGINE TORQUE, MAIN ROTOR RPM, VERTICAL ACCELERATION AT AIRCRAFT CENTER OF GRAVITY, AND OUTSIDE AIR TEMPERATURE. THE GROSS WEIGHT AT TAKEOFF AND LANDING AND THE BAROMETRIC PRESSURE WERE MEASURED AND RECORDED AS SUPPLEMENTAL DATA. THE DATA WERE PRESENTED IN A SERIES OF FREQUENCY-OF-OCCURRENCE GRAPHS; VARIATION IN TORQUE SPLITS WAS INDICATED WITH THE OTHER MEASURED PARAMETERS. THE ANALYSIS OF THE DATA INDICATES THAT THE ENGINE LOAD SPLITTING IS SIGNIFICANT AT TAKEOFF AND LANDING AND SHOULD BE INVESTIGATED FURTHER. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /70M09

AD-638 364 1/1
ARMY AVIATION MATERIEL LABS FORT EUSTIS VA

CH-54A SKYCRANE HELICOPTER FLIGHT LOADS INVESTIGATION
PROGRAM. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.

JUN 66 183P BRAUN, JOSEPH F. ; GIESSLER, F.

JOSEPH ;

REPT. NO. USAAVLABS-TR-66-58,

TASK: 1P125901A14607,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH
TECHNOLOGY, INC., DAYTON, OHIO.

DESCRIPTORS: (•HELICOPTERS, FLIGHT TESTING), DATA,
TABLES, GRAPHICS, PERFORMANCE (ENGINEERING)
IDENTIFIERS: CH-54A AIRCRAFT (U)
(U)

THE REPORT DEALS WITH THE ANALYSIS OF THE 110.4 HOURS OF CH-54A SKYCRANE DATA. CENTURY 409B OSCILLOGRAPH RECORDERS WERE USED TO COLLECT THE PARAMETERS MEASURED, INCLUDING AIRSPEED, ALTITUDE, VERTICAL ACCELERATION AT CENTER OF GRAVITY, MAIN ROTOR RPM, LONGITUDINAL CYCLIC STICK POSITION, COLLECTIVE STICK POSITION, OUTSIDE AIR TEMPERATURE, TORQUE ON EACH ENGINE, AND GAS PRODUCER RPM ON EACH ENGINE. BAROMETRIC PRESSURE AND TAKEOFF-AND-LANDING GROSS WEIGHT ESTIMATES WERE ALSO RECORDED AS SUPPLEMENTAL INFORMATION. THE FLIGHT DATA WERE DIVIDED INTO FOUR CATEGORIES BY MISSION: ASCENT, MANEUVER, DESCENT, AND STEADY STATE. THE AIRCRAFT WERE PERFORMING THEIR NORMAL MISSION FUNCTIONS DURING THE PERIOD IN WHICH THE DATA WERE COLLECTED. TIME HISTORY TABLES, HISTOGRAMS, PEAK COUNTS, AND EXCEEDANCE CURVES WERE GENERATED FROM THE DATA. AS A RESULT OF THIS STUDY, DESIGNERS NOW HAVE A LIMITED SAMPLE OF CONDITIONS EXPERIENCED BY FOUR CH-54A AIRCRAFT IN THE FIELD. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM09

AD-640 946 1/3
LOCKHEED-CALIFORNIA CO BURBANK

PARAMETRIC ANALYSIS AND PRELIMINARY DESIGN OF A
SHAFT-DRIVEN ROTOR SYSTEM FOR A HEAVY-LIFT
HELICOPTER.

(U)

DESCRIPTIVE NOTE: FINAL REPT.,
AUG 66 328P BILEZIKJIAN, VAHE ; BRYE, JAMES
M. ; CHILDERS, HARRY M. ; CONWAY, WILLIAM J. ;
GOLDSTEIN, HARRY D. ;
REPT. NO. LR-19143,
CONTRACT: DA-44-177-AMC-276(T),
PROJ: DA-1F131001D157,
MONITOR: USAAVLABS TR-66-48

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•HELICOPTER ROTORS, DESIGN), LIFT,
DRIVE SHAFTS, LOADING (MECHANICS), TRANSPORT
PLANES, WEIGHT, AERELASTICITY, ANALYSIS,
STABILITY, CONFIGURATION
IDENTIFIERS: HEAVY LIFT HELICOPTERS

(U)

(M)

A PARAMETRIC ANALYSIS AND A PRELIMINARY DESIGN
STUDY WERE CONDUCTED TO DETERMINE THE OPTIMUM
CHARACTERISTICS OF A SHAFT-DRIVEN ROTOR WHICH WOULD
RESULT IN THE LIGHTEST GROSS WEIGHT HELICOPTER
CAPABLE OF LIFTING MILITARY LOADS IN THE 12- TO 20-
TON RANGE. THE STUDY CONSIDERED SINGLE- AND
TANDEM-ROTOR HELICOPTERS WITH INTERNAL CARGO AND
CARGO POD. TYPES OF ROTORS ANALYZED WERE
ARTICULATED, TEETERED, RIGID, AND MATCHED-STIFFNESS.
EXISTING TURBINE ENGINES OR GROWTH VERSIONS THEREOF
WERE CONSIDERED. COMPONENT WEIGHT EQUATIONS WERE
DEVELOPED AND A COMPUTER PROGRAM WAS UTILIZED TO
DETERMINE THE ROTOR CHARACTERISTICS FOR EACH
HELICOPTER CONFIGURATION. FOR A GIVEN SET OF ROTOR
PARAMETERS, THE PROGRAM COMPUTED THE POWER PLANT
RATING, FUEL REQUIRED, AND THE EMPTY WEIGHT
CORRESPONDING TO THE HELICOPTER WHICH WOULD SATISFY
THE MOST CRITICAL MISSION REQUIREMENTS WITH THE
MINIMUM GROSS WEIGHT. THE PERFORMANCE OF THE
RESULTING CONFIGURATION WAS DETERMINED. DESIGN
STUDIES OF THE ROTOR SYSTEM, ROTOR CONTROLS, ROTOR/
PROPULSION ARRANGEMENT, AND THE GENERAL ARRANGEMENT
WERE MADE. ROTOR LOADS WERE DEVELOPED AND A
STRUCTURAL DESIGN ANALYSIS OF THE ROTOR SYSTEM,
INCLUDING FATIGUE AND WEIGHT ANALYSES, WAS PREPARED.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM09

AD-647 365 1/3
BOEING CO MORTON PA VERTOL DIV

STUDY OF THE HEAVY-LIFT HELICOPTER ROTOR
CONFIGURATION,

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
NOV 66 396P WAX, CHARLES M. ; TOCCI,
ROCCO C. ;
REPT. NO. R-445
CONTRACT: DA-44-177-AMC-206(T)
PROJ: DA-1P125901A142
TASK: 1P125901A14203
MONITOR: USAAVLABS TR-66-61

UNCLASSIFIED REPORT

DESCRIPTORS: (•TRANSPORT PLANES, HELICOPTERS),
(•HELICOPTER ROTORS, CONFIGURATION), LIFT,
DESIGN, OPTIMIZATION, DRIVE SHAFTS, MATHEMATICAL
ANALYSIS, STALLING, FLUTTER, AERODYNAMIC
CHARACTERISTICS, FORCE(MECHANICS),
FUSELAGES

(U)

IDENTIFIERS: HEAVY LIFT HELICOPTERS

(M)

A TWO-PART PARAMETRIC ANALYSIS AND DESIGN STUDY WAS
CONDUCTED TO DEFINE THE OPTIMUM SHAFT-DRIVEN ROTOR
SYSTEM FOR THE HEAVY-LIFT HELICOPTER. A PARAMETRIC
ANALYSIS WAS MADE FOR THE TANDEM-LIFT ROTOR SYSTEM
AND THE SINGLE-LIFT/ANTI-TORQUE ROTOR SYSTEM;
MATHEMATICAL MODELS WERE PROGRAMMED FOR DERIVATION BY
LARGE DIGITAL COMPUTERS. THE PRELIMINARY DESIGN
STUDY USED THE ROTOR GEOMETRY DETERMINED BY THE ROTOR
SYSTEM PARAMETRIC ANALYSIS. ATTENTION WAS GIVEN
PRIMARILY TO THE ARTICULATED ROTOR. STUDY OF THE
HINGELESS SEMIRIGID ROTOR WAS LIMITED TO AN
EXPLORATORY PARAMETRIC ANALYSIS WHICH, HOWEVER,
COVERS THE AREAS OF RISK, THE WEIGHT INCREMENT, AND
THE AREAS WORTHY OF FURTHER STUDY. THE PRELIMINARY
DESIGN STUDY SPECIFICALLY COVERS STALL FLUTTER, FLAP-
LAG INSTABILITY, ROTOR HUB SHAKING FORCES, AND
FUSELAGE RESPONSE. (AUTHOR)

(U)

UNCLASSIFIED

/ZOM09

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM09

AD-649 534 21/5 1/3
AVCO LYCOMING DIV STRATFORD CONN

POWER PLANT STUDY FOR SHAFT-DRIVEN HEAVY-LIFT ROTARY-
WING AIRCRAFT. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
JAN 67 192P MOELLMANN, H. ; O'CONNOR, W.

REPT. NO. 1882.1
CONTRACT: DA-44-177-AMC-242(T)
TASK: 1M121401D14415
MONITOR: USAAVLABS TR-66-42

UNCLASSIFIED REPORT

DESCRIPTORS: (*GAS TURBINES, *HELICOPTERS),
PROPULSION, ROTARY WINGS, LIFT, DESIGN,
WEIGHT, PERFORMANCE(ENGINEERING) (U)
IDENTIFIERS: HEAVY LIFT HELICOPTERS (U)

STUDIES WERE CONDUCTED ON VARIOUS MULTIENGINE GAS
TURBINE PROPULSION SYSTEMS FOR A SHAFT-DRIVEN, HEAVY-
LIFT HELICOPTER. THE HELICOPTER WAS BASED ON A
DESIGN GROSS WEIGHT OF 75,000 TO 85,000 POUNDS,
HAVING A 40,000-POUND PAYLOAD. GROWTH VERSIONS OF
EXISTING GAS TURBINE ENGINES WERE APPLIED TO THE
STUDY. THE FOLLOWING TYPES OF ENGINE SYSTEMS WERE
INVESTIGATED: FREE-POWER TURBINE, MECHANICAL
COUPLING, REGENERATIVE, FRONT DRIVE, FIXED-POWER
TURBINE, GAS COUPLING, NONREGENERATIVE, AND REAR
DRIVE. THE ENGINE PACKAGING ARRANGEMENTS WERE
VERTICAL AND HORIZONTAL INSTALLATIONS IN SINGLE-
TANDEM-, AND QUAD-ROTOR HELICOPTERS. THE PRIME
STUDY CRITERIA WERE WEIGHT SAVINGS (FUEL PLUS
INSTALLED ENGINE) AND HELICOPTER PERFORMANCE.
ADDITIONAL SUBJECTS OF STUDY WERE: POWER
AUGMENTATION BY WATER-METHANOL INJECTION OR INCREASED
TURBINE-INLET TEMPERATURE; ELECTRICAL, HYDRAULIC, AND
PNEUMATIC STARTING SYSTEMS; AND CONTROL PROBLEMS
CONCERNING LOAD SHARING, ENGINE-OUT OPERATION, AND
STABILITY. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM09

AD-651 217 1/3
HUGHES TOOL CO CULVER CITY CALIF AIRCRAFT DIV

PRELIMINARY DESIGN OF A ROTOR SYSTEM FOR A HOT CYCLE
HEAVY-LIFT HELICOPTER. (U)

DESCRIPTIVE NOTE: FINAL REPT., 17 MAR 65-31 AUG 66,
MAR 67 389P SIMPSON, JOHN R. ;
REPT. NO. HTC-AD-66-17
CONTRACT: DA-44-177-AMC-225(T)
TASK: 1F131001D15701
MONITOR: USAAVLABS TR-67-1

UNCLASSIFIED REPORT

DESCRIPTORS: (•HELICOPTER ROTORS, DESIGN), LIFT,
HELICOPTERS, ROTOR BLADES (ROTARY WINGS),
STABILITY, CONFIGURATION, STRUCTURAL PARTS,
PERFORMANCE (ENGINEERING) (U)
IDENTIFIERS: HOT CYCLE PROPULSION SYSTEMS, HEAVY
LIFT HELICOPTERS (U)

IN A PRELIMINARY DESIGN STUDY OF A ROTOR SYSTEM FOR
A HOT CYCLE HEAVY-LIFT HELICOPTER, THE FOLLOWING
ITEMS WERE ACCOMPLISHED. (1) AN ANALYTICAL
PROCEDURE WAS DEVELOPED THAT PERMITTED CALCULATION OF
FULLY COUPLED BLADE RESPONSE AND DYNAMIC STABILITY
CHARACTERISTICS; (2) PARAMETRIC AND
CONFIGURATION STUDIES INVOLVING BASIC CHARACTERISTICS
OF THE ROTOR SYSTEM WERE CONDUCTED; (3) DESIGN
LAYOUTS, STRUCTURAL DESIGN STUDIES, AND DETAILED
WEIGHT ANALYSES WERE MADE (DESIGN AND ANALYSIS WERE
LIMITED TO THE INTEGRATED LIFT-PROPULSION SYSTEM WITH
EMPHASIS ON THE ROTOR SYSTEM); (4) PRELIMINARY
DESIGN WAS COMPLETED, AND PERFORMANCE OF THE OPTIMUM
ROTOR FOR THE HEAVY-LIFT MISSION REQUIREMENTS WAS
DETERMINED; (5) A FULLY COUPLED BLADE LOADS
ANALYSIS OF THE OPTIMUM ROTOR WAS MADE; AND (6) A
FULL-SCALE MOCKUP OF THE ROTOR HUB AREA WAS
CONSTRUCTED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM09

AD-651 416 1/3
UNITED AIRCRAFT CORP STRATFORD CONN SIKORSKY AIRCRAFT
DIV

PARAMETRIC ANALYSIS AND PRELIMINARY DESIGN OF A
SHAFT-DRIVEN ROTOR SYSTEM FOR A HEAVY LIFT
HELICOPTER.

(U)

DESCRIPTIVE NOTE: FINAL REPT., 15 OCT 65-15 OCT 66,
FEB 67 638P DUTTON, WALTER J. ;
REPT. NO. 50444
CONTRACT: DA-44-177-AMC-275(T)
TASK: 1D131001D157
MONITOR: USAAVLABS TR-66-56

UNCLASSIFIED REPORT

DESCRIPTORS: (•HELICOPTER ROTORS, DESIGN), DRIVE
SHAFTS, LIFT, HELICOPTERS, PAYLOAD,
CONFIGURATION, STABILITY, MATHEMATICAL
ANALYSIS
IDENTIFIERS: HEAVY LIFT HELICOPTERS

(U)

(U)

THE PRIMARY OBJECTIVE OF THE PROGRAM WAS TO SELECT AND DESIGN A SHAFT-DRIVEN LIFTING ROTOR SYSTEM FOR A HEAVY LIFT HELICOPTER. THE SELECTION INCLUDED A COMPLETE PARAMETRIC ANALYSIS OF THE AIRCRAFT, BASED ON THREE DEFINED MISSIONS: LIFTING A 20-TON PAYLOAD 20 NAUTICAL MILES, LIFTING A 12-TON PAYLOAD 100 NAUTICAL MILES, AND FERRYING. SEVERAL AIRCRAFT CONFIGURATIONS WERE STUDIED, AND A SINGLE ROTOR CRANE ARRANGEMENT WAS SELECTED. INCLUDED IN THE STUDY WERE SELECTION OF ENGINES AND PARAMETRIC SIZING OF ALL MAJOR AIRCRAFT COMPONENT SYSTEMS. THE AIRCRAFT DEFINED HAS A TAKEOFF GROSS WEIGHT FOR THE 20-TON MISSION OF APPROXIMATELY 79,000 POUNDS, AND USES A SINGLE LIFTING ROTOR 91.6 FEET IN DIAMETER. FERRY RANGE EXCEEDS 2400 NAUTICAL MILES. WHILE DIFFERING IN DETAIL FROM ANY EXISTING HARDWARE, THE ROTOR SYSTEM DESIGN FOLLOWS DIRECTLY FROM PRESENT PRACTICE. ANALYSES OF AIRCRAFT STABILITY AND CONTROL CHARACTERISTICS AND ROTOR SYSTEM STABILITY FOR THE SELECTED CONFIGURATION WERE PERFORMED, AND THE METHODS AND RESULTS REPORTED. FOR ALL OF THE PROPERTIES STUDIED, BOTH THE AIRCRAFT AND THE ROTOR SYSTEM WERE SHOWN TO MEET OR EXCEED THE REQUIREMENTS OF APPLICABLE SPECIFICATIONS AND/OR ACCEPTED PRACTICE. (AUTHOR)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOM09

AD-667 924 1/3 1/2 17/2
BUNKER-RAMO CORP CANOGA PARK CALIF

ARMY AIRCRAFT VOICE-WARNING SYSTEM STUDY.

(U)

DESCRIPTIVE NOTE: FINAL REPT. 10 AUG 67-10 JAN 68,
FEB 68 230P BROWN, JAMES E. ; BERTONE,
CARMINE M. ; OBERMAYER, RICHARD W. ;
REPT. NO. G0131-8U1
CONTRACT: DAAD05-68-C-0025
MONITOR: HEL TM-6-66

UNCLASSIFIED REPORT

DESCRIPTORS: (•HELICOPTERS, EARLY WARNING
SYSTEMS), (•SHORT TAKE-OFF PLANES, EARLY WARNING
SYSTEMS), (•EARLY WARNING SYSTEMS, •VOICE
COMMUNICATION SYSTEMS), ARMY AIRCRAFT, OBSERVATION
PLANES, PILOTS, MALFUNCTIONS, COCKPITS, AVIATION
ACCIDENTS, HUMAN ENGINEERING, STATISTICAL ANALYSIS,
DISPLAY SYSTEMS, AUDITORY SIGNALS, INSTRUMENT
PANELS, MISSION PROFILES, JOB ANALYSIS,
QUESTIONNAIRES

(U)

IDENTIFIERS: •VOICE-WARNING SYSTEMS, UH-1B
AIRCRAFT, UH-1D AIRCRAFT, AH-1G AIRCRAFT, H-
47 AIRCRAFT, CH-47 AIRCRAFT, H-54 AIRCRAFT, CH-
54 AIRCRAFT, V-1 AIRCRAFT, OV-1 AIRCRAFT, H-1
AIRCRAFT

(U)

THE REPORT DESCRIBES AN ANALYTICAL STUDY THAT WAS
INTENDED TO SERVE AS A BASIS FOR THE APPLICATION OF
VOICE-WARNING SYSTEMS (VWS) FOR THE UH-1B AND
UH-1D (HUEY), AH-1G (Cobra), CH-47
(CHINOOK), CH-54 (SKYCRANE), AND OV-1
(MOHAWK). THE FOLLOWING PROBLEMS OF INSTALLING
A VWS IN THESE ARMY AIRCRAFT WERE STUDIED:
(1) THE IDENTIFICATION AND SELECTION OF MESSAGES
FOR MAXIMUM EFFECTIVENESS; (2) THE DETERMINATION
OF PRIORITY SEQUENCES; AND (3) THE INTEGRATION OF
THE VWS INTO EXISTING COCKPITS. THE STUDY
INVOLVED THE COLLECTION OF BASIC DATA AND THE CONDUCT
AND VALIDATION OF MISSION ANALYSES, OPERATIONAL
SEQUENCE DIAGRAMS, TASK ANALYSES, AIRCRAFT
CONFIGURATION ANALYSES, PILOT OPINION SURVEYS, AND
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PRIORITY SEQUENCES ARE DERIVED FOR ALL MAJOR
EMERGENCIES FOR THE SIX VEHICLES; FURTHER ANALYTICAL
EFFORT IS DESCRIBED WHICH REDUCED THE LIST TO 20
MESSAGES FOR INCLUSION IN THE VWS. FOR EACH
AIRCRAFT, 2 LISTS OF 20 MESSAGES ARE PROPOSED; ONE
LIST ASSUMES ADDITIONAL SENSORS,

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13. ABSTRACT This bibliography contains unclassified references on Heavy Lift Helicopters with a minimum payload of about 9,000 pounds or a minimum gross weight of 17,000 pounds. These references relate to rotor characteristics, rotor systems, rotor loads, lift propulsion, payloads, heavy lift rotors, configurations, design, and performance capabilities of the heavy lift helicopters. Computer-generated indexes of Corporate Author-Monitoring Agency, Subject, Personal Author, and Title are included.		

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